Zhengye Yang

Electrical Engineering
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RESEARCH INTERESTS

Computer Vision, Deep Learning, Machine Learning, Smart City, Edge Computing, Future Communication, Optimization.

EDUCATIONS

Columbia University, NYC, NY

9/2018 - 6/2020 M.S. in Electrical Engineering (Master Specialization)

Southeast University, China

9/2014 - 6/2018 B.S. in Electronic Science and Technology

CORE COURSEWORKS

Statistical Learning, Computer Network, Computer Communication Network, Intro to Database, Big Data Analytics, Analysis of Algorithms, Deep Learning, Deep Learning for Computer Vision, Advanced Topics Project: Deep Learning, Computer Architecture and Logic Design, Fundamentals of Circuit, Fundamentals of Analog Electronic Circuits, Microcomputer Systems and Interfaces, Numerical Computing Methods, Mathematical Methods of Physics.

RESEARCH EXPERIENCE

8/2020 - Present **Medical Image Augmentation, Machine Learning Engineer (Atelier Peak, LLC)**

- Experimented with skin image dataset. Explored visual features in different color spaces to study the representation of different skin colors and textures.
- Applied AngularGAN to correct illumination effects from skin images.
- Experimented Swapped Autoencoder for skin texture extraction.
- Reproduced DermGAN model.
- Formed a grant proposal.

9/2019 - Present **COSMOS Smart City Intersection, Research Group Lead**
Advisor: Zoran Kostic

- Modified and trained YOLOv3, SSD, YOLOv4 single stage object detection algorithms to detect objects from bird's eye camera. Implemented YOLOv4 to Nvidia Deepstream to build a real-time traffic surveillance pipeline.
- Designed a social distancing analysis system to monitor social distancing execution.

- Managed the collection of multi-camera object detection/tracking datasets with over 40k images.
- Designed a bounding box transformation model to merge multi-camera detection results.

6/2019 – 9/2019 **COSMOS Smart City Intersection**
Research Assistant
Advisor: Zoran Kostic

- Designed an optical-flow based multiple objects tracking algorithm.
- Collected videos and annotated 2k frames of bird's eye view dataset for tracking task.

PUBLICATIONS

Yang, S., Bailey, E., **Yang, Z.**, Ostrometzky, J., Zussman, G., Seskar, I., & Kostic, Z. (2020). COSMOS smart intersection: Edge compute and communications for bird's eye object tracking. In *Proc. 4th International Workshop on Smart Edge Computing and Networking (SmartEdge'20)*.

MANUSCRIPTS IN PREPARATION

Zhengye Y., Mingfei S., Hongzhe Y., Zihao X., Gil Z., & Zoran K. (2020). *B-SDA: Bird's Eye View Social Distancing Analysis System.* Manuscript in preparation.

POSTER PRESENTATION

Mahshid G., **Zhengye Y.**, Mingfei S., Hongzhe Y., Zihao X., Zoran K., Javad G. & Gil Z. (2021) *COSMOS Testbed – Proximity Detection and Social Distancing Estimation in COVID-19 Pandemic.* Workshop on Challenges for Digital Proximity Detection in Pandemics: Privacy, Accuracy, and Impact, NIST, Online.

Zhengye, Y., Mingfei S., Hongzhe Y., Zihao X., Gil Z., & Zoran K. (2020). *Privacy Preserving Social Distancing Analysis in a Metropolis.* Poster presentation accepted at Machine Learning in Science & Engineering Conference, Online.

TEACHING & MANAGEMENT EXPERIENCE

9/2019 - present **COSMOS Smart City Intersection, Columbia University, New York, NY**
Research group lead

- Coordinated research work of half-a-dozen students.
- Contributed to the definition of topics for research on smart intersections.
- Created a series of tutorials for research assistants and students.
- Virtual machine images management.
- Supervised the collection of the dataset, and data annotation.
- Coordinated the writing and editing of a conference paper and reports.

Spring 2020 **Course Assistant**
Neural Networks & Deep Learning Research (ELEN6040)

PROFESSIONAL ACTIVITIES

03/2020 **Data Science Day**, Columbia University, New York, NY
Smart City: Deep Learning in the Edge-Cloud for COSMOS Smart Intersection
(Prepared slides for presentation, Q&A)

03/2020 **IEEE PerCom- SmartEdge 2020 4th International Workshop on Smart Edge Computing and Networking**
(Prepared slides and Q&A)

COURSEWORK PROJECTS

2/2020 – 5/2020 **Unsupervised Polyphonic Music Generation**
Instructor: Peter Belhumeur

- Created a MIDI music bars dataset and designed a WGAN+GP based model to generate coarse multi-track polyphonic music bars and retrained a multi model unsupervised image-to-image translation model (MUNIT) to further polish the music bars.
- Explored and reviewed methodologies of unsupervised emotion extraction from image/video and emotion encoding.

10/2019 – 12/2019 **Unsupervised Dog-Cat Transfiguration**
Instructor: Peter Belhumeur

- Collected real world dogs and cats' images to create an image transfiguration dataset.
- Collected real world dogs and cats' soundtracks to create a voice translation dataset.
- Applied pretrained Mask-RCNN to acquire instance segmentation masks, then adopted the idea from WGAN to improve the multi model unsupervised image-to-image translation model (MUNIT). And used MUNIT to achieve dog-cat image-to-image translation.
- Trained the voice CycleGAN to achieve the corresponding voice conversion.

3/2019 – 5/2019. **Self-Supervised Foreground Segmentation**
Instructor: Iddo Drori

- Applied PWC-net to estimate optical flow of videos and use cluster to create foreground pseudo ground truth.
- Trained a U-net model to learn foreground segmentation with the pseudo ground truth annotation.

2/2019 – 3/2019 **Online Seafood Retail Database**
Instructor: Alexandros Biliris

- Designed a relational database with SQL schema to achieve registration, login, order, product trace, comment, vendor searching, allergy filter services.
- Designed a web application with UI to interact with the database.

11/2018 – 12/2018 **DB-World Email Classification**
Instructor: Predrag Jelenkovic

- Applied bootstrap and one-hot encoder to create a large corpus from 64 emails, run SVM and Decision Tree to reproduce the paper result.
- Set up a series of experiments to prove the experiment method of the original paper is unreliable and apply Random Forest to create a robust model to classify emails.

11/2018 – 12/2018 **Layer-3 network**
Instructor: Ethan Katz-Bassett

- Built a customized 3 layers network to achieve intra-domain, inter-domain connection and wrote customized BGP policy to reflect real-world business relationships and traffic management.

9/2018 – 11/2018 **Video bitrate adaptation proxy**
Instructor: Ethan Katz-Bassett

- Implemented a video proxy with automatic bitrate adaptation by using socket programming and evaluated its fairness and smoothness and utilization.

SKILLS

Technical

- Programming language: Python, CPP
- Statistic analytical tool: R, SPSS
- Deep learning framework: Pytorch, Darknet, Tensorflow
- Deep learning inference accelerator: TensorRT, Deepstream

Professional

- Manuscript writing
- Grant writing
- Project management

Language

- Chinese (Native)
- English (Fluent)

HONORS & AWARDS

2020 Columbia data science institute scholarship
2016 HELLA scholarship
2016 Southeast university merit student

References

- **Zoran Kostic**, Columbia university
  Title: Professor of Professional Practice, Director of the MS EE Program
  Email: zk2172@columbia.edu

- **Gil Zussman**, Columbia university

Title: Professor, EE Department Vice Chair
Email: gz2136@columbia.edu

- **Javad Ghaderi**, Columbia university
  Title: Associate professor
  Email: jghaderi@ee.columbia.edu